Claims

Claim 1. A valve, comprising:

a valve body having first and second ends, the valve body defining a hollow valve body interior extending between the first and second ends that couples the first and second ends in fluid communications;

an opening-defining portion of the valve body that defines an access opening in the valve body;

isolator means for enabling a user to selectively stop and unstop fluid communications between the first and second ends of the valve body, including a valve-stopping mechanism removably mounted within the access opening; and

connection-facilitating means on the opening-defining portion of the valve body for facilitating the fluid-tight removable connection of a separate isolation valve assembly to the opening-defining portion of the valve body in a position over the access opening that enables the user to remove the valve-stopping mechanism from the access opening through the isolation valve assembly.

Claim 2. A valve as recited in claim **1**, wherein the opening-defining portion of the valve body includes a flange that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body by bolting.

Claim 3. A valve as recited in claim **1**, wherein the opening-defining portion of the valve body includes an exterior thread that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body by threaded engagement.

Claim 4. A valve as recited in claim **1**, wherein the opening-defining portion of the valve body includes at least one annular groove that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body with sealing member between the isolation valve assembly and the opening-defining portion.

Claim 5. A valve as recited in claim **1**, wherein the opening-defining portion of the valve body includes at least one annular groove that functions as means for facilitating connection of the isolation valve assembly to the opening-defining portion of the valve body with a mating annular ring on the isolation valve assembly.

Claim 6. A valve as recited in claim **1**, wherein the opening-defining portion of the valve body includes at least one annular ring that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body with a mating annular groove on the isolation valve assembly.

Claim 7. A valve as recited in claim **1**, wherein the opening-defining portion of the valve body includes at least one segmented annular groove that functions as means for facilitating connection of the isolation valve assembly to the opening-defining portion of the valve body with a mating segmented annular ring on the isolation valve assembly in a cam lock engagement.

Claim 8. A valve as recited in claim **1**, wherein the opening-defining portion of the valve body includes at least one segmented annular ring that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body with a mating segmented annular groove in the isolation valve assembly in a cam lock engagement.

Claim 9. A valve as recited in claim **1**, wherein the valve-stopping mechanism is removably mounted within the hollow valve body.

Claim 10. A method for repairing under pressure a valve having a valve body, an opening-defining portion of the valve body that defines an access opening, a valve-stopping mechanism removably mounted within the access opening, and means on the opening-defining portion of the valve body for facilitating the connection of a separate isolation valve assembly to the opening-defining portion, the method comprising:

providing a valve-servicing assembly of which the isolation valve assembly is a part such that the isolation valve assembly has first and second ends and a size large enough to enable a user to remove the valve-stopping mechanism from the access opening through the isolation valve assembly, the valve-servicing assembly including a chamber-defining structure connected to the second end of the isolation valve assembly that defines a chamber in which the valve-stopping mechanism fits;

connecting the first end of the isolation valve assembly to the opening-defining portion of the valve body in a position over the access opening;

withdrawing the valve-stopping mechanism from the access opening, through the isolation valve assembly, into the fluid-tight chamber; and

closing the isolation valve assembly.

Claim 11. A method as recited in claim **10**, further comprising:

removing the valve-stopping mechanism from the fluid-tight chamber and servicing the valve-stopping mechanism;

placing the valve-stopping mechanism back into the fluid-tight chamber;

opening the isolation valve assembly; and

advancing the valve-stopping mechanism from the fluid-tight chamber through the isolation valve assembly back into the access opening.

Claim 12. A method as recited in claim **11**, further comprising the step of disconnecting the first end of the isolation valve assembly from the opening-defining portion of the valve body.

Claim 13. A method as recited in claim **10**, further comprising:

removing the valve-stopping mechanism from the fluid-tight chamber;

placing a replacement valve-stopping mechanism into the fluid-tight chamber;

opening the isolation valve assembly; and

advancing the replacement valve-stopping mechanism from the fluid-tight chamber through the isolation valve assembly into the access opening.

Claim 14. A method as recited in claim **13**, further comprising the step of disconnecting the first end of the isolation valve assembly from the opening-defining portion of the valve body.

Claim 15. A method as recited in claim **10**, further comprising the step of cleaning the hollow interior of the valve body through the isolation valve assembly.

Claim 16. A valve as recited in claim **10**, wherein the valve-stopping mechanism is removably mounted within the hollow valve body.

Claim 17. A valve, comprising:

a valve body having first and second ends, the valve body defining a hollow valve body interior extending between the first and second ends that couples the first and second ends in fluid communications;

an opening-defining portion of the valve body that defines an access opening in the valve body; and

connection-facilitating means on the opening-defining portion of the valve body for facilitating the fluid-tight removable connection of a separate isolation valve assembly to the opening-defining portion of the valve body in a position over the access opening that enables the user to install a valve-stopping mechanism into the access opening through the isolation valve assembly.

Claim 18. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes a flange that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body by bolting.

Claim 19. A valve as recited in claim **17**, wherein the valve-stopping mechanism is installed into the hollow valve body through the isolation valve assembly.

Claim 20. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes an exterior thread that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body by threaded engagement.

Claim 21. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes an exterior thread and at least annular O-ring groove that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body by threaded and compressed rubber engagement.

Claim 22. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes an exterior thread and at least one receiving O-ring surface that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body by threaded and compressed rubber engagement.

Claim 23. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes at least one annular groove that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body with sealing member between the isolation valve assembly and the opening-defining portion.

Claim 24. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes at least one annular groove that functions as means for facilitating connection of the isolation valve assembly to the opening-defining portion of the valve body with a mating annular ring on the isolation valve assembly.

Claim 25. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes at least one annular ring that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body with a mating annular groove on the isolation valve assembly.

Claim 26. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes at least one segmented annular groove that functions as means for facilitating connection of the isolation valve assembly to the opening-defining portion of the valve body with a mating segmented annular ring on the isolation valve assembly in a cam lock engagement.

Claim 27. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes at least one segmented annular ring that functions as means for facilitating the connection of the isolation valve assembly to the opening-defining portion of the valve body with a mating segmented annular groove in the isolation valve assembly in a cam lock engagement.

Claim 28. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes an interior thread that functions as means for facilitating the connection under pressure of the valve-stopping mechanism to the opening-defining portion of the valve body by threaded engagement.

Claim 29. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes an interior thread that functions as means for restraining the connection under pressure of the valve-stopping mechanism to the opening-defining portion of the valve body by threaded engagement and as means for allowing at least one O-ring sealing surface in the opening-defining portion.

Claim 30. A valve as recited in claim **17**, wherein the opening-defining portion of the valve body includes at least one actuating member which includes threads formed thereon and threadedly mounted in said opening-defining portion so that when activated moves into and out of engagement of the valve-stopping mechanism.

Claim 31. A valve as recited in claim **17**, further comprising at least one segment-engaging element coupled to said segment and slidably mounted in the opening-defining portion of the valve body for engaging and locking said segment in position to restrain the valve-operating mechanism and at least one actuating member including threads formed thereon and threadedly mounted in said opening-defining portion for slidingly actuating said segment engaging member for moving said segment into and out of engagement of the valve-stopping mechanism.